IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Hiroshi KAMIKAWA Group Art Unit: 1774

Application No.: 10/743,713 Examiner: Bruce H. Hess

Filed: December 24, 2003

For: HEAT-SENSITIVE RECORDING MATERIAL

DECLARATION UNDER 37 C.F.R. §1.132

Honorable Commissioner of Patents and Trademarks

P.O. Box 1450, Alexandria, Virginia 22313-1450

Sir:

I, Hiroshi Kamikawa, do declare and state as follows:

I graduated from Mie Prefectural Matsusaka Technical High School, Department of Industrial Chemistry in March 1975;

I joined Fuji Photo Film Co., Ltd. in April 1975 and have been working there since;

I was involved in the development of photopolymers for electronic materials from July 1975 to March 1977;

I was involved in the development of photopolymers for printing materials from April 1977 to September 1982;

I was involved in the development of heat-sensitive recording materials from October 1982 to February 1999;

I was involved in the development of heat-sensitive recording materials for medical applications from March 1999 to March 2004;

From April 2004 to present, I have been involved in the development of photopolymers for electronic materials;

I am the inventor of the subject matter disclosed and claimed in the above-identified application; and

I am familiar with the Office Action of September 14, 2005, and understand that the Examiner has rejected Claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over Hosoi (U.S. Patent No. 5,525,571).

The following additional experiments were carried out under my supervision in order to make the advantages of the subject matter more clear.

Experiment 1: Preparation of Microcapsules used by Hosoi

Firstly, the microcapsule dispersion A, containing TAKENATE D-110N (trade name, currently manufactured by Mitsui Takeda Chemicals, Inc.) and SUMIDUR N3200 (trade name, currently manufactured by Sumika Bayer Urethane Co., Ltd.) as constituents for forming a capsule wall, and the microcapsule dispersion B, containing TAKENATE D-110NH as a constituent for forming a capsule wall, were prepared in the same manner as "Example 1" of

Hosoi as described in column 15, line 61 to column 16, line 8 of Hosoi. Then, glass transition temperatures (Tgs) of the resulting capsule walls of the microcapsules in the microcapsule dispersions A and B were respectively measured using a DMTA, whereby it was found that Tg of the microcapsule dispersion A was 130°C and Tg of the microcapsule dispersion B was 140°C.

Experiment 2: Preparation of Microcapsules for Additional example

Further, a microcapsule dispersion A' was prepared in the same manner as the microcapsule dispersion A, except that emulsification was performed under a condition of 12,000 rpm for 10 minutes in place of the condition of 10,000 rpm for 5 minutes used in the preparation of the microcapsule dispersion A. The thus prepared microcapsule dispersion A' had a volume average particle diameter of 0.3 μm.

Experiment 3: Evaluation of Heat-sensitive materials

Comparative example 3 was prepared in the same manner as "Example 1" of Hosoi as described in column 15, line 61 to column 16, line 8 of Hosoi.

Example 5 was prepared in the same manner as Comparative example 3, except that the microcapsule dispersion A' was used in place of the microcapsule dispersion A.

Heat-sensitivity and gradation of each of Comparative example 3 and Example 5 were evaluated in the same manner as

described on page 45, line 23 to page 46, line 10 of the specification of the present application. Results thereof are shown in Table 3. For reference, Examples 1 to 4 and Comparative examples 1 to 2 as disclosed in Table 1 of the specification of the present application are also shown in Table 3.

Structural ratios of contained amounts of microcapsules derived from the microcapsule dispersions A (vol. av. diameter: 0.7 μm) and B (vol. av. diameter: 0.7 μm) contained in a layer (A layer), that is applied to a support, and a layer (B layer), that is applied to an anti-reflection layer overcoated to the A layer, of Comparative example 3, are calculated as follows based on the description in column 20, lines 27-30 of Hosoi.

- Mixing amount of microcapsule A (solid content: 20.9%): 16.3g
  - Solid content of microcapsule A: 3.407g
- Mixing amount of microcapsule B (solid content: 30.7%): 25.2g
  - Solid content of microcapsule B: 7.736g
- Structural ratio of contained amounts of microcapsules derived from the microcapsule dispersion A:

$$3.407/(3.407 + 7.736) \times 100 = 30.6 \text{ (wt\%)}$$

- Structural ratio of contained amounts of microcapsules derived from the microcapsule dispersion B:

$$7.736/(3.407 + 7.736) \times 100 = 69.4 \text{ (wt\%)}$$

Table 3

	Microcapsules of Higher Tg (° C)		Microcapsules of Lower Tg (° C)		Heat-sensitive recording layer microcapsule structural ratio (% by weight)				Applied energy at an image density of 1.0 (mj/mm²)	Applied energy at an image density of 1.5 (mj/mm²)	Change in density γ
					A layer		B layer				
	Tg (° C)	Particle diameter (μm)	Tg (° C)	Particle diameter (μm)	Higher Tg	Lower Tg	Higher Tg	Lower Tg			
Example 1	193	0.80	153	0.30	82.1	17.9	25	75	74.9	85.6	8.5
Example 2	185	0.80	153	0.30	82.1	17.9	25	75	75.7	86.9	9.0
Example 3	193	0.80	128	0.30	82.1	17.9	25	75	77.6	88.8	8.3
Example 4	193	0.80	153	0.30	82.1	17.9	48.9	51.1	76.0	87.5	8.4
Comparative example 1	193	0.80	···	···	100	···	100	···	91.6	100.5	12.4
Comparative example 2	···	···	153	0.30	···	100	···	100	71.0	77.5	13.0
Comparative example 3	140	0.70	130	0.70	69.4	30.6	···	100	60.5	66.5	12.2
Example 5	140	0.70	130	0.30	69.4	30.6	···	100	72.0	62.0	7.7

As can be understood from the above results, Example 5, which uses two kinds of microcapsules having different volume average particle diameters and is within the scope of the present invention, is superior to Comparative example 3 in the expression of the gradation of an image, since the examples of the present invention have smaller changes in density as a factor of applied energy as compared with that of Comparative example 3.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

DATE: March 7, 2006

Hiroshi Kamikawa

Hiroshi KAMIKAWA